

ABSTRACT OF THE DISCLOSURE

In one embodiment, a portable apparatus adapted to be battery powered is used to scan an object in situ with x-rays and measure the intensity of the diffracted x-rays. The 5 apparatus includes a scanning head having an x-ray source that is battery powered and an x-ray detector. The x-ray source and the x-ray detector are aligned in one of a plurality of predetermined alignments such that x-rays from the x-ray source are incident upon an object at a specific angle and the x-ray detector is aligned to detect x-rays that are diffracted at a specific angle, wherein the specific angle is a Bragg angle for a particular 10 plane of atoms in the object.